

**WHAT IS CLAIMED IS:**

1       1. A wireless communication device capable of downloading a  
2 software update file from a wireless network, said wireless  
3 communication device comprising:

4                 a non-volatile memory capable of being re-programmed by  
5 sectors, wherein said non-volatile memory stores: 1) a target file  
6 to be updated, 2) said downloaded software update file, and 3) a  
7 journal comprising a plurality of entries, each of said plurality  
8 of entries containing status information associated with a re-  
9 programmed sector of said non-volatile memory;

10                a random access memory; and

11                a main processor capable of replacing target code in said  
12 target file with replacement code from said downloaded software  
13 update file, wherein said main processor creates a first block of  
14 replacement code in said random access memory and re-programs a  
15 first target sector of said non-volatile memory by storing said  
16 first block of replacement code into said first target sector, and  
17 wherein said main processor updates first status information in a  
18 first entry in said journal associated with said first target  
19 sector.

1        2. The wireless communication device as set forth in Claim 1  
2 wherein said first status information comprises a first parameter  
3 indicating that said first block of replacement code was  
4 successfully stored in said first target sector.

1        3. The wireless communication device as set forth in Claim 2  
2 wherein said main processor is further capable of storing first  
3 target code from said first target sector in a save-area of said  
4 non-volatile memory prior to storing said first block of  
5 replacement code into said first target sector.

1        4. The wireless communication device as set forth in Claim 3  
2 wherein said first status information comprises a second parameter  
3 indicating that said first target code from said first target  
4 sector was successfully stored in said save-area of said non-  
5 volatile memory.

1        5. The wireless communication device as set forth in Claim 4  
2 wherein said main processor is further capable of storing said  
3 first target code from said save-area back into said first target  
4 sector after a power loss in said mobile station.

1       6. The wireless communication device as set forth in Claim 5  
2 wherein said first block of replacement code in said random access  
3 memory is equivalent in size to a sector of said non-volatile  
4 memory.

1       7. The wireless communication device as set forth in Claim 6  
2 wherein said main processor, after said wireless communication  
3 device is restarted after a power loss, uses status information  
4 stored in said journal to identify a last successfully re-  
5 programmed sector in said non-volatile memory.

1       8. The wireless communication device as set forth in Claim 7  
2 wherein said main processor resumes replacing target code in said  
3 target file with replacement code from said downloaded software  
4 update file by re-programming a next sequential sector in said non-  
5 volatile memory following said last successfully re-programmed  
6 sector.

1       9. The wireless communication device as set forth in Claim 8  
2 wherein said journal is stored in at least a first journal sector  
3 and a second journal sector of said non-volatile memory.

1           10. The wireless communication device as set forth in Claim 9  
2 wherein said main processor, in response to a determination that  
3 said first journal sector is full of journal entries, erases said  
4 second journal sector and stores a next journal entry in said  
5 second journal sector.

1        11. A method of upgrading software in a wireless  
2 communication device capable of downloading a software update file  
3 from a wireless network, the wireless communication device  
4 comprising a non-volatile memory that is re-programmed by sectors  
5 and stores: 1) a target file to be updated, 2) the downloaded  
6 software update file, and 3) a journal comprising a plurality of  
7 entries, each of the plurality of entries containing status  
8 information associated with a re-programmed sector of the non-  
9 volatile memory, the method of upgrading software comprising the  
10 steps of:

11              creating a first block of replacement code in a random  
12 access memory of the wireless communication device using  
13 replacement code from the downloaded software update file;

14              re-programming a first target sector of the non-volatile  
15 memory by storing the first block of replacement code into the  
16 first target sector; and

17              updating first status information in a first entry in the  
18 journal associated with the first target sector.

1       12. The method as set forth in Claim 11 wherein the first  
2 status information comprises a first parameter indicating that the  
3 first block of replacement code was successfully stored in the  
4 first target sector.

1       13. The method as set forth in Claim 12 further comprising  
2 the step of storing first target code from the first target sector  
3 in a save-area of the non-volatile memory prior to storing the  
4 first block of replacement code into the first target sector.

1       14. The method as set forth in Claim 13 wherein the first  
2 status information comprises a second parameter indicating that the  
3 first target code from the first target sector was successfully  
4 stored in the save-area of the non-volatile memory.

1       15. The method as set forth in Claim 14 further comprising  
2 the step of storing the first target code from the save-area back  
3 into the first target sector after a power loss in the mobile  
4 station.

1       16. The method as set forth in Claim 15 wherein the first  
2 block of replacement code in the random access memory is equivalent  
3 in size to a sector of the non-volatile memory.

1        17. The method as set forth in Claim 16 further comprising  
2        the step, after the wireless communication device is restarted  
3        after a power loss, if using status information stored in the  
4        journal to identify a last successfully re-programmed sector in the  
5        non-volatile memory.

1        18. The method as set forth in Claim 17 further comprising  
2        the step of resuming replacing target code in the target file with  
3        replacement code from the downloaded software update file by re-  
4        programming a next sequential sector in the non-volatile memory  
5        following the last successfully re-programmed sector.

1        19. The method as set forth in Claim 18 wherein the journal  
2        is stored in at least a first journal sector and a second journal  
3        sector of the non-volatile memory.

1        20. The method as set forth in Claim 19 further comprising  
2        the steps, in response to a determination that the first journal  
3        sector is full of journal entries, of erasing the second journal  
4        sector and storing a next journal entry in the second journal  
5        sector.

1           21. A wireless communication device capable of receiving an  
2 incoming software update file transmitted by a wireless network,  
3 said wireless communication device comprising:

4                 a non-volatile memory capable of being re-programmed by  
5 sectors, wherein said non-volatile memory stores: 1) a downloaded  
6 software update file, and 2) a journal comprising a plurality of  
7 entries, each of said plurality of entries containing status  
8 information associated with a re-programmed sector of said non-  
9 volatile memory;

10                a random access memory; and

11                a main processor capable of storing replacement code from  
12 said incoming software update file in said downloaded software  
13 update file, wherein said main processor stores a first block of  
14 replacement code from said incoming software update file in said  
15 random access memory and re-programs a first target sector of said  
16 downloaded software update file in said non-volatile memory by  
17 storing said first block of replacement code into said first target  
18 sector, and wherein said main processor updates first status  
19 information in a first entry in said journal associated with said  
20 first target sector.

1        22. The wireless communication device as set forth in Claim  
2        21 wherein said first status information comprises a first  
3        parameter indicating that said first block of replacement code was  
4        successfully stored in said first target sector.

1        23. The wireless communication device as set forth in Claim  
2        22 wherein said main processor is further capable of storing first  
3        target code from said first target sector in a save-area of said  
4        non-volatile memory prior to storing said first block of  
5        replacement code into said first target sector.

1        24. The wireless communication device as set forth in Claim  
2        23 wherein said first status information comprises a second  
3        parameter indicating that said first target code from said first  
4        target sector was successfully stored in said save-area of said  
5        non-volatile memory.

1        25. The wireless communication device as set forth in Claim  
2        24 wherein the main processor is further capable of storing the  
3        first target code from the save-area back into the first target  
4        sector after a power loss in the mobile station.

1        26. A method of downloading software in a wireless  
2 communication device capable of receiving an incoming software  
3 update file transmitted by a wireless network, the wireless  
4 communication device comprising a non-volatile memory that is re-  
5 programmed by sectors and stores: 1) a downloaded software update  
6 file, and 2) a journal comprising a plurality of entries, each of  
7 the plurality of entries containing status information associated  
8 with a re-programmed sector of the non-volatile memory, the method  
9 of upgrading software comprising the steps of:

10              storing a first block of replacement code from the  
11 incoming software update file in the random access memory;

12              re-programming a first target sector of the downloaded  
13 software update file in the non-volatile memory by storing the  
14 first block of replacement code into the first target sector; and

15              updating first status information in a first entry in the  
16 journal associated with the first target sector.

1        27. The method as set forth in Claim 26 wherein the first  
2 status information comprises a first parameter indicating that the  
3 first block of replacement code was successfully stored in the  
4 first target sector.

1        28. The method as set forth in Claim 27 further comprising  
2        the step of storing first target code from the first target sector  
3        in a save-area of the non-volatile memory prior to storing the  
4        first block of replacement code into the first target sector.

1        29. The method as set forth in Claim 28 wherein the first  
2        status information comprises a second parameter indicating that the  
3        first target code from the first target sector was successfully  
4        stored in the save-area of the non-volatile memory.

1        30. The method as set forth in Claim 29 further comprising  
2        the step of storing the first target code from the save-area back  
3        into the first target sector after a power loss in the mobile  
4        station.